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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,406	11/19/2003	Charles Q. Zhan	120 06741US	7240

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EXAMINER	
LE, TOAN M	
ART UNIT	PAPER NUMBER
2863	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/31/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/717,406	ZHAN ET AL.	
	Examiner	Art Unit	
	Toan M. Le	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 October 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-23 are rejected under 35 U.S.C. 102(a) as being anticipated by "Wavelet-Based Pressure Analysis for Hydraulic Pump Health Diagnosis", Gao et al. (referred hereafter Gao et al.).

Referring to claims 1, 8, and 15, Gao et al. disclose a method; apparatus; a computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code (Abstract); comprising:

decomposing a signal comprising a plurality of process variable measurements into a plurality of decomposed signals at a plurality of resolution levels, the process variable measurements associated with operation of a valve (page 971, 2nd col., 3rd and last paragraphs to page 972, 1st col., 1st and 2nd paragraphs);

grouping the decomposed signals into a plurality of groups (page 971, 2nd col., 3rd and last paragraphs to page 972, 1st col., 1st paragraph);

identifying one or more defect indicators for at least some of the resolution levels using the groups, and

using the one or more defect indicators to identify a possible defect in the valve;

wherein identifying the one or more defect indicators for one of the resolution levels comprises using relationships between the decomposed signal in one of the groups to identify one or more defect indicators at one of the resolution levels (page 971, 2nd col., 3rd and last paragraphs to page 972, 1st col., 1st and 2nd paragraphs; page 972, 2nd col., 2nd and 3rd paragraphs; page 976, 1st col., 1st paragraph).

As to claims 2, 9, and 16, Gao et al. disclose a method; apparatus; a computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code, wherein:

decomposing the signal comprises performing wavelet decomposition to generate wavelet coefficients at each of the resolution levels (page 971, 2nd col., 3rd and last paragraphs);

grouping the decomposed signals comprises grouping the wavelet coefficients at multiple resolution levels into groups of wavelet coefficients (page 972, 1st col., 1st paragraph; equation 10); and

identifying the one or more defect indicators comprises performing singularity detection using the groups of wavelet coefficients (page 972, 2nd col., 2nd and 3rd paragraphs; page 976, 1st col., 1st paragraph).

As to claims 3, 10, and 17, Gao et al. disclose a method; apparatus; a computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code (page 971, 1st col., 1st, 2nd, and 3rd paragraphs; page 976, 1st col., 1st paragraph).

Referring to claims 4, 11, and 18, Gao et al. disclose a method; apparatus; a computer program embodied on a computer readable medium and operable to be executed by a processor,

the computer program comprising computer readable program code, wherein the one or more defect indicators identify one or more jumps in the process variable measurements (page 971, 2nd col., 2nd paragraph).

As to claim 5, Gao et al. disclose a method, wherein the one or more jumps represent one or more deterministic signal changes where the process variable measurements change by a threshold amount within a given time period (page 969, 2nd col., 1st paragraph; page 971, 2nd col., 2nd paragraph).

Referring to claims 6, 12, and 19, Gao et al. disclose a method; apparatus; a computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code, wherein using the one or more defect indicators to identify the possible defect in the valve comprises:

selecting one of the resolution levels; and

determining a probability of a valve defect based on the defect indicators at the selected resolution level (page 971, 2nd col., 3rd and last paragraphs to page 972, 1st col., 1st and 2nd paragraphs).

Referring to claims 7 and 14, Gao et al. disclose a method; apparatus; a computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code, wherein grouping the decomposed signals levels into the plurality of groups comprises grouping the decomposed signals from three adjacent resolution levels into each groups, the groups forming overlapping groups where at least some of the decomposed signals form part of two or more groups (page 972, 2nd col., 2nd and 3rd paragraphs; figures 4-7).

As to claims 13 and 20, Gao et al. disclose an apparatus; a computer program embodied on a computer readable medium and operable to be executed by a processor, the computer program comprising computer readable program code, wherein the one or more processors are further collectively operable to generate a second signal and supply the second signal to a valve adjuster, the valve adjuster operable to use the second signal to adjust an opening of the valve. (figure 1; pages 970-971, Materials and Methods section; page 976, 1st col., 1st paragraph).

Referring to claims 21-22, Gao et al. disclose a system, comprising:

a valve (figure 1);

a measuring device operable to generate a signal comprising measurements of a process variable associated with operation of the valve;

a controller operable to generate output values for adjusting the valve based on the process variable measurements (pages 970-971, Materials and Methods section); and

a defect detector operable to:

decompose the signal into a plurality of decomposed signals at a plurality of resolution levels (page 971, 2nd col., 3rd and last paragraphs to page 972, 1st col., 1st and 2nd paragraphs);

group the decomposed signals into a plurality of groups, each group comprising decomposed signals at multiple resolution levels (page 971, 2nd col., 3rd and last paragraphs to page 972, 1st col., 1st paragraph); and

identify one or more defect indicators for at least some of the resolution levels using the groups, the one or more defect indicators associated with a possible defect in the valve, wherein the one or more defect indicators at one of the resolution levels are identified using relationships between the decomposed signals in one of the groups and wherein the defect detector forms part

of the controller (page 971, 2nd col., 3rd and last paragraphs to page 972, 1st col., 1st and 2nd paragraphs; page 972, 2nd col., 2nd and 3rd paragraphs; page 976, 1st col., 1st paragraph; figure 1).

As to claim 23, Gao et al. disclose a method, wherein identifying the one or more defect indicators comprises, for each of the groups, using relationships between the decomposed signals in that group to identify one or more defect indicators for that group, the one or more defect indicators for each group associated with a different one of the resolution levels (page 971, 2nd col., 3rd and last paragraphs to page 972, 1st col., 1st and 2nd paragraphs; page 972, 2nd col., 2nd and 3rd paragraphs; page 976, 1st col., 1st paragraph).

Response to Arguments

Applicant's arguments filed 10/27/06 have been fully considered but they are not persuasive.

Referring to claims 1, 8, 15, and 21, Applicant argues that "This allows a determination to be made as to whether a hydraulic pump is defective (but does not identify the type of fault if the pump is defective)." And that "Also, there is no 'plurality of groups' in this technique (where each 'group' includes 'decomposed signals at multiple resolution levels')." And that 'Once again, there is no "grouping" of "decomposed signals" from multiple "resolution levels" into a single group in this second technique of Gao.'

Answer: Gao discloses "It was also assumed that a loose piston shoe would cause a flow loss (q_p), and a worn distributing disc would cause a flow loss (q_d). Such flow loss would change the actual flow to $Q_s = q_o - q_p - q_d$." (page 972, 2nd col., lines 3-6) And that 'Because w_2 and w_3 represented the feature signals caused by a loose piston shoe or a worn swash plate, the proper

critical coefficient for distinguishing a loose piston shoe and the worn swash plate should be cd_2 and cd_3, respectively.' (page 972, 2nd col., lines 15-18)

Thus, Gao discloses identifying the type of fault.

Gao also discloses "When a signal satisfies the relationship of $P_{mo-1}\ f(t) = P_{mo-1}\ f(t) + D_{mo}\ f(t)$, it implies that the signal can be fine-scaled at $P_{mo}\ f(t) = f_o$ and be decomposed into $f_o = P_{mo-1}\ f(t) + D_{mo-1}\ f(t) = f_1 + d_1$, where f_1 is the next coarser approximation of f_o. The discrete model of wavelet analysis can therefore be represented as follows: (equation 9).

Using the same approach, f_i can be further decomposed into $f_i = f_{i+1} + d_{i+1}$, I=1, 2, ...,. Based on this scheme, a set of examining signals is decomposed using a low-pass filter and a high-pass filter, which results in two sets of sub-band signals. The sub-band signals are then reassembled to perform wavelet analysis." (page 971, 2nd col., 3rd paragraph to page 972, 1st col., 1st and 2nd paragraphs).

In addition, equation 10 shows grouping of decomposed signals from multiple resolution levels into a single group.

Conclusion

THIS ACTION IS MADE FINAL.

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toan M. Le whose telephone number is (571) 272-2276. The examiner can normally be reached on Monday through Friday from 9:00 A.M. to 5:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571) 272-2269. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Toan Le

January 17, 2007

John Barlow
Supervisory Patent Examiner
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